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The "moderator variable" hypothesis states that the degree of correspondence between workers' abilities and the ability requirements of a job will correlate with job performance or satisfactoriness, with the degree of correlation varying with the satisfaction level. This hypothesis may be operationalized in two ways: (1) when workers are employed at one job, the ability requirements of the job become a constant across all subjects: consequently, ability level can be used as a predictor of satisfactoriness; and (2) when workers are employed at different jobs, measures of correspondence between each worker's abilities and the ability requirements of his job are used. Two studies, conducted to test both forms of the hypothesis, and using blue-collar and white-collar workers as subjects, measured the variables of satisfaction, satisfactoriness and ability. Results indicated support of both forms of the hypothesis. This has implications for further selection and placement research, as well as for increased understanding and improved managing of the behavior of individuals at work. (LS)

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Satisfaction as a Moderator of the Relationship Between Abilities and Satisfactoriness[1]

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The traditional approach to the problem of predicting satisfactoriness consists of assessing an individual's abilities and correlating the resulting scores with various measures of job performance. It is well known that validity coefficients reported for this classic prediction model have been useful, but in recent years have appeared to reach an upper limit. Most reported correlations developed within the framework of the classic prediction model range between .20 and .30 and rarely exceed .50 (Dorcus & Jones, 1950; Ghiselli, 1955; Ghiselli, 1966). This suggests the need to consider other variables which might contribute to improved levels of prediction.

Partly as a reaction to the results generated by the traditional correlational model, it has become more common in the last ten to fifteen years to conceptualize satisfactoriness as some function of ability and motivation. Maier (1955) has hypothesized that a multiplicative relationship, rather than an additive one, exists between ability and motivation as predictors of satisfactoriness. Gagne and Fleishman (1959) and more recently Vroom (1964) have suggested that some form of the ability-motivation model may have validity beyond the classic problem which orginally stimulated its development. For example, Vroom (1960), using a measure of motivation which was based on the extent to which workers participated in decisions and the degree to which they expressed needs for independence, reported higher correlations between ability and performance for individuals high in motivation, and lower correlations for individuals low in motivation. Thus, level of motivation served to

moderate the relationship between ability and performance in Vroom's 1960 study.

Dawis, England and Lofquist, in their Theory of Work Adjustment (1964), postulate a moderator variable role for job satisfaction in the prediction of satisfactoriness from abilities. Dawis et al. hypothesize that the degree of correspondence between workers' abilities and the ability requirements of the job will correlate with job performance or satisfactoriness, "the degree of correlation varying with the satisfaction level (i.e., the higher the satisfaction level, the higher the correlation between ability-requirement correspondence and satisfactoriness)." (Dawis et al., 1964, p. 13)

This hypothesis may be operationalized in two ways. When all the workers are employed at one job, the ability requirements of the job become a constant across all subjects. In such a case, ability level can be used instead of degree of correspondence as the predictor of satisfactoriness. This cannot be done when the workers are employed at different jobs. In such a case, some measure of correspondence between each worker's abilities and the ability requirements of his job has to be utilized. The research reported here is designed to test the Dawis et al. "moderator variable" hypothesis, under both operationalizations of the "correspondence" variable.

Method

Two separate studies were conducted to test both forms of this hypothesis. Each study employed different samples of subjects and different measuring instruments. The first study was designed to test the hypothesis for a sample of subjects performing the same job, while the second study was designed to test the hypothesis for a sample of subjects performing different jobs, but within the same general type of work environment (i.e., blue-collar, white-collar). The methodology for each study will be presented separately.

Study I

Subjects

The study involved a group of 352 assemblers employed in one large manufacturing concern. Participants were selected randomly from a pool of volunteers with the following restrictions: (a) approximately equal numbers of males and females; and (b) approximately equal numbers from each of ten ranks based on supervisor evaluation of performance. The analysis group (individuals with complete data) consisted of 169 males and 183 females. Although the two sex groups were selected on the same basis, they were found to differ in age and tenure, and to a lesser extent in education. The male group ranged in age from 21 to 64 years with a median of 30.7, the female group from 21 to 66 years but with a median of 42.7. Tenure for the males varied from 3 to 54 years with a median of 8.3, and for the females, from 2 to 29 years with a median of 13.4. Highest school grade completed for the males ranged from 7 to 15 years with a median of 11.4, and for the females from 6 to 14 years with a median of 11.1.

Variables

Satisfaction. A short form of the Minnesota Satisfaction Questionnaire (MSQ) was used to measure job satisfaction (Weiss, Dawis, England, and Lofquist, 1967). The full scale MSQ is designed to measure satisfaction on 20 different dimensions. The short form MSQ consists of 20 items, the one from each of the 20 MSQ scales which correlated highest with its total scale score. The first principal component of these 20 items was found to be a general factor, with significant loadings on all variables. Using an exact factor score solution (Harman, 1960), a general satisfaction factor score was computed from scores on these 20 items.

Satisfactoriness. Two measures of job performance were used: average productivity, based on production records for the four week period immediately

preceding testing; and supervisor evaluation of employee performance on a scale ranging from 1 (low) to 10 (high) based on a ranking of the work group into tenths. As a result of the sampling method used, the entire range of supervisor evaluation of performance was represented in the sample.

The correlation coefficients obtained between the two job performance measures (productivity and supervisor evaluation) were .42 (for the total male group) and .24 (for the total female group). These correlation coefficients indicate that the two measures measured different aspects of job performance and were sufficiently independent of each other to be treated as separate criterion variables.

Abilities. Eight ability tests from Form A of the Employee Aptitude Survey (Ruch and Ruch, 1963) were administered to the employees. Number of correct responses was used as the score for each test. The eight tests yielded ten variables, as follows: Verbal Comprehension; Numerical Ability, Part I; Numerical Ability, Part II; Numerical Ability, Part III; Visual Pursuit; Visual Speed and Accuracy; Space Visualization; Numerical Reasoning; Verbal Reasoning; and Manual Speed and Accuracy.

Analysis

To control for the sex variable, data for each sex group were analyzed separately. Within each sex group a three step multiple correlation analysis was performed. The first step consisted of computing the multiple correlation between the ten ability test scores (as the independent variables) and each of the two job performance indices. The second step consisted of computing the multiple correlation between the ten ability test scores plus the job satisfaction score (as the independent variables) and each of the two job performance criteria. The third step in the analysis treated job satisfaction as a moderator variable. Each sex group was divided into thirds according to the

distribution of job satisfaction scores. Within each job satisfaction subgroup a multiple correlation was computed between the ten ability test scores (as the independent variables) and each of the two job performance criteria.

Study II

Subjects

The subjects in the second study were volunteer participants in the Work Adjustment Project at the Industrial Relations Center, University of Minnesota. The study group consisted of 506 employed individuals who completed a series of ability tests. The analysis group included 254 blue-collar workers and 252 white-collar workers (Carlson, 1965).

The blue-collar employees were predominantly male with a median age of 37 years. The white-collar group consisted mostly of males, but had more female members than did the blue-collar group. In addition, the white-collar employees were younger, with a median age of 32 years. Median education for the blue-collar employees was 10.3 years and for the white-collar employees, 12.2 years. It should be noted that one-half of the total study group had physical or mental disabling conditions.

Variables

Satisfaction. The measure of job satisfaction employed was a short form of the Hoppock Job Satisfaction Blank (Hoppock, 1935). This instrument consists of four items, each of which requires the responding individual to choose from among seven graduated statements the one which best expressed his state of job satisfaction. Responses to the Hoppock Blank were scored from 1 (the most unfavorable or dissatisfied response), to 7 (the most favorable or satisfied response). Each person's total score consisted of the sum of his response scores to the four items (Carlson, Dawis, England and Lofquist, 1962).

Satisfactoriness. The measure of job performance used in the second study was a supervisor rating scale developed by Carlson, Dawis, England, and Lofquist (1963). The scale consisted of five items: overall ranking, quality of work,

promotability, pay raise, and job adjustment.

The overall ranking was scored with weights 3, 2, and 1 for "above average" (upper one fourth), "average" (the middle one-half) and "below average" (the lowest one-fourth), respectively. The remaining four items were scored from 5 to 1, the most favorable evaluation being assigned a score of 5 and the most unfavorable a score of 1.

Ability-job requirement correspondence. The measurement of correspondence specified by the Dawis et al. hypotheses requires quantitative measures of the workers and of the work environment in the same terms, i.e. in terms of the same set of ability dimensions for the measurement of the worker's abilities and the ability requirements of the job. One test instrument which meets these qualifications is the General Aptitude Test Battery (GATB) when used in conjunction with the Worker Trait Requirements (WTR). The GATB is a multiple ability test developed by the United States Employment Service (U. S. Department of Labor, 1962). It consists of paper-and-pencil and apparatus tests which measure nine job-relevant abilities: G, General Intelligence; V, Verbal Ability; N, Numerical Ability; S, Spatial Ability; P, Form Perception; Q, Clerical Perception; K, Motor Coordination; F, Finger Dexterity; and M, Manual Dexterity. The WTR (U. S. Department of Labor, 1954) provides ratings of job requirements for 4,000 jobs in terms of the nine GATB ability measures. The ratings, made by job analysts, indicate the proportion of the working population possessing the ability to a degree necessary for satisfactory job performance, using the following rating scale:

1--the highest 10% of the working population

2--the upper third exclusive of the upper 10%

3--the middle third of the working population

4--the lowest third exclusive of the lowest 10%

5--the lowest 10% of the working population

For example, the job of personnel clerk was rated 3 on the "general intelligence" (G) factor. This means that a successful personnel clerk should be in the middle one-third of the general population in terms of the GATB ability measure G. The WTR thus provided ratings of various jobs in terms of ability requirements. The use of the GATB provided comparable ability scores for the worker on the same set of nine ability dimensions. GATB scores were transformed to ratings comparable to the WTR ratings by employing the published general population percentile norms. Once scores were available on each ability dimension for an individual and for the individual's job, a correspondence score could be devised.

An absolute difference score was selected as the correspondence score for use in the statistical analysis. Thus, there were nine correspondence scores for each individual; one for each ability dimension. Prior to analysis a constant of +1 was added to each correspondence score to eliminate zero scores. In addition, the scale was reversed so that high scores represented high ability correspondence (low absolute difference) and low scores represented low ability correspondence (high absolute difference).

Analysis

Analysis was conducted separately for blue-collar and white-collar groups. Each group was subjected to exactly the same form of moderator variable analysis as was employed in the first study. However, instead of ability scores being employed as independent variables, the nine scores for individual-ability correspondence were used. In addition, instead of dividing the group into equal thirds, the group was divided such that within each job satisfaction group the variance in the job performance ratings was more homogeneous than it was across the total group.

Results

Study I

Table 1 summarizes the findings for the first study. For the total

male group, the multiple correlation coefficients between ability tests and satisfactoriness measures were .43 and .44 for average productivity and supervisor evaluation respectively. Both were statistically significant at the .01 level. For the total female group, the corresponding multiple correlation coefficients were .26 and .27, neither of which was statistically significant. None of the above correlation coefficients were significantly altered when job satisfaction was treated as an independent variable and included with the ten ability test scores (see Table 1).

[Insert Table 1 about here]

The effect of job satisfaction treated as a moderator variable is shown in Table 1 and is reflected in the multiple correlation coefficients obtained for the job satisfaction subgroups. For the male group, coefficients of .63 and .69 were obatined for the "high" job satisfaction subgroup. These coefficients were statistically significant at the .01 probability level. For the "middle" and "low" job satisfaction subgroups, the multiple R's ranged from .34 to .52, none of which were statistically significant. These results support the hypothesis under consideration, i.e., that job satisfaction moderated the relationship of ability test scores with satisfactoriness criteria.

For the female group, the results only partially support the hypothesis. The one significant R obtained was for the "high" job satisfaction subgroup in the prediction of average productivity (R=.63, significant at the .01 level). The results for supervisor evaluation did not follow expectations. None of the other R's obtained for the job satisfaction subgroups of the female sample (ranging from .29 to .42) were statistically significant.

Study II

Table 2 presents a summary of the analysis for the second study. The multiple correlation coefficients between job performance rating and ability-

Table 1

Multiple correlation coefficients in the prediction of satisfactoriness from abilities and job satisfaction, by sex group and job-satisfaction-moderated subgroups.

Group and Independent Variables	N[a]	Satisfactoriness: Productivity Index R[b]	Satisfactoriness: Supervisor Evaluation R
Males			
1. Total group, ten ability measures	169	.43**	.44**
2. Total group, ten ability measures and job satisfaction.....	169	.47**	.46**
3. High job satisfaction subgroup, ten ability measures	56	.63**	.69**
Average job satisfaction subgroup, ten ability measures.....	57	.48	.52
Low job satisfaction subgroup, ten ability measures.....	56	.42	.34
Females			
1. Total group, ten ability measures.....	183	.26	.27
2. Total group, ten ability measures and job satisfaction.....	183	.26	.27
3. High job satisfaction subgroup, ten ability measures.....	61	.63**	.34
Average job satisfaction subgroup, ten ability measures.....	61	.29	.33
Low job satisfaction subgroup, ten ability measures.....	61	.42	.38

[a]Number of individuals

[b]Multiple correlation coefficient

**Statistically significant at .01 probability level

correspondence were .21 for the total blue-collar group and .08 for the white-collar group, both coefficients being statistically non-significant (at the .05 probability level). When job satisfaction was included with the nine ability-correspondence measures as the independent variables, the multiple correlation coefficients were .25 and .19 for the total blue-collar and white-collar groups respectively, neither of which was statistically significant at the .05 probability level.

[Insert Table 2 about here]

The effect of job satisfaction as a moderator variable is again reflected in the multiple correlation coefficients reported for the satisfaction subgroups. Coefficients of .56 and .53 were obtained for the "high" job satisfaction subgroups in the blue-collar and white-collar occupational groups respectively. These coefficients were statistically significant at the .05 probability level. For the "average" and "low" job satisfaction subgroups, the multiple correlation coefficients were .28 and .37 respectively, for the blue-collar workers, and .27 and .23 respectively for the white-collar workers. None of these coefficients was statistically significant.

Discussion

The results of the two studies reported here lend empirical support to the position taken by Dawis et al. (1964) in A Theory of Work Adjustment, that job satisfaction plays a moderator variable role in the relationship between satisfactoriness and measured ability. However, this conclusion must be somewhat qualified by the absence of cross-validation samples in both of the above studies. In addition, the lower multiple correlation coefficients obtained for the female assemblers suggest either a sex difference in the prediction of supervisor evaluation or invalidity in the criterion data for the female sample on that criterion measure. However, the similarity of findings on the two criterion measures for the male subgroups, on the average productivity criterion

Table 2

Multiple correlation coefficients in the prediction of satisfactoriness from ability correspondence, by occupational group and job-satisfaction-moderated subgroups.

Group and Independent Variables	Blue Collar N[a]	Blue Collar R[b]	White Collar N	White Collar R
1. Total Group, nine correspondence measures.....	254	.21	252	.08
2. Total group, nine correspondence measures and job satisfaction.....	254	.25	252	.19
3. High job satisfaction subgroup, nine correspondence measures.....	66	56*	66	53*
Average job satisfaction subgroup, nine correspondence measures.....	91	.28	74	.27
Low job satisfaction subgroup, nine correspondence measures.....	97	.37	112	.23

[a]Number of individuals

[b]Multiple correlation coefficient

*Statistically significant at .05 probability level

for the female subgroup, and for the blue- and white-collar subgroups indicates some degree of validity generalization. This is further strengthened by the fact that different measures of independent and dependent variables were used in the two studies, and that ability requirement correspondence was also differently operationalized. In addition, recent work by Lawler (1966) using ratings of ability in place of test scores has resulted in findings compatible with the hypothesis under investigation in this article.

If the findings of the two studies reported in this article continue to be replicated, they have implications for selection and placement research, as well as for understanding and managing the behavior of individuals at work. If the findings were replicated in a predictive (as opposed to a concurrent) validation setting, they would indicate that the moderating effect of job satisfaction should be taken into account in deriving occupational aptitude (or ability) patterns or in deriving prediction equations reflecting the ability requirements of jobs. To use job satisfaction as a moderator variable in prediction settings, it will first be necessary to determine the conditions which maximize job satisfaction and to develop ways of predicting it. Such a start has been made in research by Weiss, Dawis, England and Lofquist (1964, 1965). From the standpoint of managing job performance, the evidence is clear that some measure of motivation as well as of ability is required to predict job performance most accurately, and therefore to provide for its control most effectively.

Footnote

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